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Bearing Plates," which was illustrated by twenty-five or thirty lantern slides, presented a summary of a bulletin soon to be issued by the Engineering Experiment Station of the University of Illinois.

The author deduced the proper theory of resistance of base plates, formulas for the safe thickness of plates of rectangular and tapered cross-sections of cast iron, and recommended the substitution and use of the straight line formula in place of the theoretical formula of very tedious application, the construction and use of a series of graphical tables for rapidly and accurately determining the dimensions and thickness of base plates employed in practical construction.

Professor A. H. Blanchard, Providence, R. I., who is assistant engineer for the State Board of Public Roads of Rhode Island, presented "An Analysis of Highway Traffic in Rhode Island."

The conclusions drawn by the writer for the roads examined are:

1. The amount of motor-car traffic which will cause disintegration is much less than is generally supposed.

2. In the case of two roads subjected to practically the same amount of motor-car traffic, the rate of disintegration will depend upon the location of the road, other conditions being equal.

3. The rate of disintegration of an ordinary macadam surface will vary almost directly as the percentage of motor-car traffic.

4. The popular belief that trap rock is the ideal road material for the surface of all macadam roads independent of the nature of the traffic to which they are subjected is a fallacy. In the case of roads subjected to horse-drawn vehicle traffic consisting of pleasure and light commercial traffic, or subjected to motor-car traffic, either exclusively or in combination with light horse-drawn vehicle traffic, the trap rock surface is exceedingly expensive to maintain. This is due to the fact that very little dust is furnished by abrasion on account of the hardness of the broken stone and hence, the binder being absent, the surface ravels under horse-drawn vehicle traffic or is disintegrated by motor-car traffic.

5. Bituminous macadam roads require a sealed surface when the highway traffic consists of a combination of heavy motor-car traffic and heavy horse-drawn vehicle traffic, while the sealed surface is not a requisite when the road is subjected to only heavy motor-car traffic. The sealed surface is considered necessary for the first class as insurance against the disintegration of the surface due to the liability of the loosening of the exposed stone by blows from the hoofs of horses

and the rapid enlargement of any break in the surface by motor-car traffic.

"Recent Progress in Aeronautics," by Major G. A. Squier, U.S.A., has already appeared in SCIENCE (February 19, 1909). The lecture was very completely illustrated with lantern slides and set forth the present state of the art in a pleasing and impressive manner.

In this connection, it should be noted that the association has decided to foster this growing branch of applied science. The council will refer all papers on engineering and aeronautics to Section D, whose officers will cooperate with their authors for adequate presentation and publication.

In the paper on "State Engineering Experiment Stations," by Professor G. W. Bissell, East Lansing, Mich., the writer reviewed and compared some of the provisions of the Hale and the McKinley experiment station bills, of which the latter is now before Congress and presented the principal arguments for such a measure.

The following papers were read by the secretary in the absence of the authors:

New Methods of Back-water Computations: Professor B. F. GROAT, Minneapolis, Minn.

Variation of Pressure on the Side of a Track Spike: Professor H. S. JACOBY, Ithaca, N. Y.

Note on Specially Designed Corliss Engine for Experimental Work: Professor A. M. GREENE, Jr., Troy, N. Y.

The Specific Speed of Hydraulic Turbines: Professor L. P. MOODY, Troy, N. Y.

On the "Degree" of Railroad Curves: Professor W. G. RAYMOND, Iowa City, Iowa.

The following papers were read by title:

A Problem for State Engineering Colleges: Professor A. E. HAYNES, Minneapolis, Minn.

Temperature Stresses in Reinforced Concrete Chimneys: Professor E. R. MAURER, Madison, Wis.

A New Type of Reinforced Building Construction: Professor J. J. FLATHER, Minneapolis, Minn.

All papers were interesting and valuable and evidenced care in their preparation. The program should have been published in SCIENCE in advance. The secretary will see that this is done for the next meeting.

G. W. BISSELL,
Secretary

SOCIETIES AND ACADEMIES

THE NEBRASKA ACADEMY OF SCIENCES

The nineteenth annual meeting of the Nebraska Academy of Sciences was held in Lincoln, Feb-

ruary 12 and 13. A larger number than usual of members out in the state were present. President A. A. Tyler delivered the president's address, on "Evidences of Evolution from the Development of Leaves."

The following papers were read before the academy:

"The Brown Chert of the Republican Valley," by E. E. Blackman.

"The Manufacture of Hog Cholera Vaccine," by A. T. Peters.

"The Season of 1908 in the Sioux County Bone Beds" (illustrated), by E. H. Barbour.

"Geometry as Pure Mathematics," by E. W. Davis.

"Paint and the Protection of Lumber," by J. Mortenson.

"Modeling Plant Structures in Paraffin," by R. J. Pool.

"A Preliminary Study in the Ethnobotany of Nebraska," by M. R. Gilmore.

"Notes on Western Indian Language," by A. E. Sheldon.

"The Scientific and Practical Value of Making Nebraska a Tuberculosis-free State," by H. W. Orr.

"A Plan for Completing the State Flora," by C. E. Bessey.

"Some Features of the Flora of Grand Island, Nebraska," by C. J. Elmore.

"The Problem of Defective Sight," by H. B. Duncanson.

"Comparison of Parasitic Fauna in Atlantic and Pacific Salmon," by H. B. Ward.

"Are Species Realities or Concepts Only?" by J. H. Powers.

"Legislative Restrictions to Animal Experimentation," by A. E. Guenther.

"The Importance of a Sanitary Milk Supply," by H. H. Waite.

"Is the Number of Chromosomes a Test in the Alternation of Generations in Plants?" by R. J. Pool.

"Notes on the Missouri Valley Loess," by S. W. Stookey.

"Measurements of Evaporation in Nebraska," by G. A. Loveland.

The session on Saturday afternoon was given over to a symposium on the "Economic Resources of Nebraska" with the following subjects and leaders:

"Trees"—Professor F. J. Phillips.

"Birds"—Professor R. H. Wolcott.

"Insects"—Professor L. Brunner.

"Forage and Fruits"—Professor C. E. Bessey.

"Minerals"—Professor G. E. Condra.

"Fish"—Professor H. B. Ward.

The academy accepted the invitation of the Nebraska Chapter of the Sigma Xi to hear the address of Professor A. G. Webster, of Clark University, on "The Creed of a Scientist," and adjourned its regular meeting on Friday evening in order to join with the botanical seminar in a Darwin anniversary meeting with the following program:

"Pre-Darwinian Evolution," by Mr. Pool.

"The Life of Darwin," by Dr. Walker.

"Darwin as a Zoologist," by Professor Ward.

"Darwin and the Geological Record," by Professor Barbour.

"Darwin's Contributions to Botany," by Professor Bessey.

"Darwin's Contributions to Plant Physiology," by Professor Wilcox.

The following were elected officers of the academy for the coming year:

President—Professor G. E. Condra, Lincoln.

Vice-president—Professor A. T. Bell, University Place.

Secretary—Professor F. D. Barker, Lincoln.

Treasurer—Professor R. J. Pool, Lincoln.

F. D. BARKER,
Secretary

THE ACADEMY OF SCIENCE OF ST. LOUIS

ON Monday evening, February 15, 1909, the regular meeting of the St. Louis Academy of Science was held at the Academy Building, 3817 Olive Street. The following program had been arranged by the committee to commemorate the centenary of the birth of Charles Darwin (February 12, 1809):

"Darwin as a Naturalist," Professor S. M. Coulter.

"Darwin's Influence upon Geology," Professor W. E. McCourt.

"The Natural Selection Theory and its Later-Day Critics," Professor J. F. Abbott.

"Some Aspects of Darwin's Influence upon Modern Thought," Professor A. O. Lovejoy. (Read by Dr. Joseph Grindon.)

At the conclusion of the special program, Professor Nipher presented to the academy some changes in the manner of his experiments, and some of the additional results that he has obtained in his studies of "Momentum Effects in Electric Discharge"—reports of which have from time to time appeared in *SCIENCE*.

He reported that he had modified the arrangement of the wire forming the angle, in his study

of momentum effects in electrical discharge. The angle is now formed as follows: A vertical wire leads downward to the plate-holder. Its lower end terminates in a pin, the head of which is soldered to the end of the wire, and the point of the pin is just above the cover of the plate-holder. Its distance from the cover can be varied by vertical adjustment. The horizontal wire forming one side of the angle has one end soldered to the vertical wire, thus making a right angle. The distance from this junction to the pin may be varied. Satisfactory operation is obtained when the junction is midway between the head and the point of the pin. In this way a right angle is formed with a discharge point below the vertical wire, and in line with it. Such angle-wires may be coupled with each other by joining either their horizontal or their vertical wires. The results are the same as those announced heretofore.¹ But the results are more easily obtained with this arrangement than with the one previously described.

Professor Nipher also finds that the shadow pictures obtained depend upon the material of the plate-holder. With a cover of paper or thin hard rubber, the presence of electrons is shown by branching discharge lines from the images on the film. Refraction effects are also clearly shown. When the cover is of glass or mica, with black paper, the images are like those formed by X-rays, and no refraction is shown.² By using a machine of large capacity and by arming a metal plate with many points directed toward a sheet of glass, shadow pictures of larger objects may be obtained.

W. E. McCourt,
Recording Secretary

THE TORREY BOTANICAL CLUB

THE first meeting of the club for 1909 was held at the American Museum of Natural History on January 12, President Rusby in the chair.

This being the annual meeting, reports were presented by the treasurer, editor, chairman of the field committee and secretary. These were read, accepted and placed on file.

The following officers were elected for the year 1909:

President—Henry Hurd Rusby.

Vice-presidents—Edward Sandford Burgess and John Hendley Barnhart.

Secretary—Percy Wilson.

¹ SCIENCE, July 14, 1908, and December 4, 1908.

² SCIENCE, February 5, 1909.

Treasurer—William Mansfield.

Editor—Marshall Avery Howe.

Associate Editors—John Hendley Barnhart, Jean Broadhurst, Philip Dowell, Alexander W. Evans, Tracy Elliot Hazen, William Alphonso Murrill, Charles Louis Pollard and Herbert Maule Richards.

THE meeting of the club was held at the Museum of the New York Botanical Garden on January 28, President Rusby in the chair.

The scientific program consisted of two papers, of which the following abstracts were prepared by the authors:

Studies in the Embryology of the Mistletoe, Dendropemon: MISS MARY M. BRACKETT.

This study was made from two species of Loranthaceæ—*Dendropemon caribæus*, gathered by Professor F. E. Lloyd from lime-trees in Dominica, and *Dendropemon parvifolius* collected by the writer from the bitter-broom, *Baccharis*, at Cinchona, in the Blue Mountains of Jamaica.

The flowers of *Dendropemon* are perfect, regular and symmetrical. The buds form in clusters of three in the axils of the leaves, and are protected by bracts. The corolla consists of six petals, which, in *D. parvifolius*, are of a reddish color on the outside, and a delicate pink within. There are six stamens borne upon an inferior ovary, the three fertile stamens alternating with three sterile stamens. The flower has one style and one stigma. At the top of the ovary is the cup-shaped calyculus.

At the time that the corolla and stamens appear as rounded knobs, two carpellary leaves meet over a central placenta, forming a cavity. The carpellary and placental tissues gradually unite, filling the cavity. Growth in the length of the pistil begins to be rapid, and the stamens develop. During this time cell-division is going on in the region of the nucellus. There is, however, nothing to mark the development of an ovule as a distinct organ, nor is there any indication of integument. In the center of the ovary the cells increase in number and size and contain large nuclei. They elongate parallel to the main axis, become irregular, and constitute the archesporial tissue. Their growth is accompanied by periclinal division in the adjacent cells. Several large archesporial cells form megaspores; the neighboring cells become disorganized and gradually disintegrate. Apparently only one of the megaspores becomes an embryo-sac.

The embryo-sac was not made out in these species; but a long slit was observed reaching from the center of the ovary into the tissues of the style, which, it seemed, had been occupied by the embryo-sac. Of this Hofmeister says ("Neue Beiträge zur Kenntniss der Embryobildung der Phanerogamen," 539. 1859): "The growth in length of the embryo-sac is not ended with its formation. The sac makes its way through entangled cells of the closed style to a quarter of its length upwards."

Young stages of the proembryo were observed composed of four, and then of six cells in two parallel rows, with the long suspensor, of three greatly elongated cells, reaching into the tissues of the style for nearly half its length.

The embryo occupies a vertical position in the center of the berry, and from its position in the surrounding tissue, suggests all the characters of an orthotropous ovule. As the embryo develops, it is surrounded with endosperm. A change in the nature of the tissue below the embryo suggests a series of conducting cells between the embryo and the starch-filled cells in the lower part of the ovary. The cotyledons become green, and the suspensor gradually disappears, except for a few capping cells at the anterior end of the embryo, which now occupies the ovarial cavity for almost its entire length.

The points of particular interest are: the rapid disintegration of the cells of the gynæcium before and after fixation; the lack of an ovule as a distinct organ; the lack of integument; and the green color of the embryo as it lies in the berry.

Botanical Observations in Iceland and Spitzbergen: Miss JULIA T. EMERSON.

In July, 1908, the writer was so fortunate as to take a three-weeks' trip, touching at the following places: Kirkwall, in the Orkney Islands; Thorshavn, the chief town of the Faroes; the city of Reykjavik and village of Akreyri, in Iceland; Advent Bay and Bell Sound, in the Island of Spitzbergen; and then south to the North Cape of Norway and many places of interest on that coast.

Although all the points visited were on the coast or within reach of salt water, the flora changed according to the latitude, just as it does when one climbs a mountain, and as we went north we left behind the summer or spring vegetation which we found in Kirkwall, passed a treeless growth in Iceland, and at Spitzbergen came

to an alpine flora with representatives found in the United States only on mountain summits or in the high Rockies. For instance, at Thorshavn buttercups, marigolds, forget-me-nots, daisies and other spring flowers were in bloom, and there were potatoes and gooseberries in the gardens. Our first sight of Iceland had been of great snow-fields, and we were astonished, therefore, to find any familiar plants on land. In the town were some of the plants mentioned above and two little specimens of trees, a sycamore maple and a mountain ash, very stunted, and the vegetables would not have grown without protection of the houses and good soil; on the great stony stretches which surround Reykjavik a little pink thyme, *Statice maritima*, *Silene maritima* and *S. acaulis*, *Polygonum viviparum*, *Alchemilla alpina*, several species of *Galium* and *Tofieldia palustris* were more or less abundant, and at Akreyri there was quite a luxuriant vegetation near a little waterfall outside of the settlement; pretty *Dryas octopetala*, *Eriophorum angustifolium* and *E. vaginatum*, *Parnassia palustris*, *Viola tricolor*, *Pinguicula vulgaris* and some of our ordinary weeds, also a number of mosses, especially *Grimmias*. At Spitzbergen the stones, where not covered by snow, were gay with the Iceland poppy, *Saxifraga oppositifolia*, pink or white and with a delicate odor, beautiful *Pedicularis lanata*, the pink of the flowers showing through a veil of gray hairs, *Potentilla emarginata* and *Cassiope tetragona*, making a sort of turf or bog close to the melting snow. Here we had twenty-four hours of sunshine, and the scenery was of strong contrasts, wet black or gray rocks, dazzling glaciers and dancing blue waters, where numberless birds fearlessly rested or floated about.

The contrast between these arctic conditions and the rich growth of grass, sweet yellow violets, pink campions and geraniums, etc., which we found growing in the flank of the North Cape of Norway, was very marked, but on the flat top of the cape there was only a scanty number of hardy stone-crops and other low things which could find protection between the stones from the fierce winds. The first trees seen on the southward part of the journey were birches, and they were at Lyngenfjord, still north of the arctic circle. In climbing the mountain at Digermullen we noticed the following plants, *Calluna vulgaris*, whose common name of "lyng" is said to have suggested the name of the fjord, *Cornus suecica*, violets, *Trientalis europæa*, *Vaccinium* and *Andromeda polifolia*.

The two days spent at Merok and Gudvangen amidst their stupendous cliffs and beautiful fjords were a fitting climax to an inspiring and wonderful cruise.

Dr. Britton showed a photograph of a new and interesting cycad collected by Dr. MacDougal and Dr. Rose in Tomellin Cañon, Mexico, in 1906. The plant was sent to the New York Botanical Garden and installed in the propagating houses, where it remained for two years before showing any signs of growth. This appears to be a new species of *Dioon*.

Dr. Murrill exhibited a number of tropical fruits obtained on his recent trip to Jamaica.

THE club met at the American Museum of Natural History on February 9, at 8:15 P.M., and was called to order by President Rusby.

The announced paper of the evening on "The Rubber Forests of Mexico" was then presented by Dr. H. H. Rusby. The lecture was illustrated by lantern-slides made from photographs, many of which were obtained by the speaker while in the field. This paper has been printed in full in the January number of the *Journal of the New York Botanical Garden*, and an abstract accompanied by illustrations will appear at an early date in *Torreya*.

PERCY WILSON,
Secretary

THE AMERICAN CHEMICAL SOCIETY NORTHEASTERN SECTION

THE ninetieth regular meeting of the section was held at the Twentieth Century Club, Boston, on February 19. Dr. Arthur L. Day, director of the Carnegie Geophysical Laboratory, of Washington, D. C., addressed the section on "Some Recent Work in Geophysics." After pointing out the necessity of applying the principles of physical chemistry to the solution of many geological problems, the speaker described the electrical furnaces used in his laboratory for maintaining temperatures of about 1,500° C. He stated that the transition points for a number of one-component and two-component systems of minerals had been determined at this high temperature and that work was now in progress on a three-component system.

Professor Henry P. Talbot, of the Massachusetts Institute of Technology, presented a paper upon "Present Conceptions of the Action of the Common Indicators used in Acidimetry, and Some of

their Applications." The recent advances in the knowledge of the reactions which indicators themselves undergo in changing from acid to alkaline solutions was fully reviewed and the advantages to be derived by the proper choice of indicators was clearly illustrated by experiments.

KENNETH L. MARK,
Secretary

THE BIOLOGICAL SOCIETY OF WASHINGTON

THE 454th meeting was held February 6, 1909, with President Palmer in the chair.

Dr. M. W. Lyon, Jr., exhibited skins and skulls of the oriental genus *Gymnura* and of the American opossum, *Didelphis*, and pointed out the close general superficial resemblances in external and cranial characteristics of these two groups of mammals from such widely separated portions of the world and members of different superorders, the Monodelphia and the Didelphia.

The chair noted the capture near Washington, on September 1, 1908, of a specimen of the little black rail, by Mr. H. M. Darling, on the eastern branch of the Potomac. For the locality this is the third actual specimen and fourth record of this the smallest of the game birds, the first record for the District of Columbia being in 1861. Though its range is from Massachusetts to the West Indies and Guatemala, the bird is seldom seen.

Dr. O. F. Cook, in a brief statement on "Mitapsis and Amitapsis," called attention to the possible importance of the recent investigations of Dr. Reginald R. Gates, of Chicago University, in the cytology of *Oenothera*. The suggestion was made that the lack of any evidence of fusion of chromatin threads at synapsis may be of more significance than the subsequent differences in the number or distribution of the chromosomes. The name *amitapsis* was proposed for the newly discovered condition in which no fusion of chromatin takes place, to contrast with *mitapsis*, the name given by Cook and Swingle to the process of chromatin fusion, considered as the final stage of the process of conjugation. Mitapsis has no necessary connection with synapsis, which is the name of the closely coiled condition of the chromatin skein. Gates finds synapsis in *Oenothera*, but no indication of mitapsis; the extremely delicate threads visible before synapsis are simple. A longitudinal splitting begins after synapsis, but is not carried out, and the new chromosomes are formed in a single chain.

If amitapsis should prove to be associated with self-fertilization it would help to explain why self-fertilized plants produce highly uniform progeny, as in vegetative propagation, whereas the progeny of normally cross-fertilized plants have notable individual diversity. Germ-cells arising through amitapsis could be viewed as vegetative products, rather than as fully sexual products of conjugation. It is easy to understand that the union of amitaptic germ-cells might merely reproduce the parental characters. Thus amitapsis may account for the uniformity of self-fertilized types, as well as for their liability to mutative derangements of characters.

The regular program consisted of the following communications:

The Blue Foxes of the Pribilof Islands: JAMES JUDGE.

The blue foxes of the Pribilof Islands are presumed to have come from the mainland of Alaska on the ice with which Bering Sea is filled during winter. The caves and subterranean passages left by the volcanic upheaval furnish the foxes with homes.

In summer the bird life furnishes an abundance of the choicest fox food. When the birds depart in the fall fox food consists of drift from the beach and the bodies of seals or sea lions which have either been killed, or died the preceding summer. This was ample until 1890, when the lessened seal and sea lion catches reduced the winter food supply and many of the animals died of starvation. The dead were eaten by the survivors, and the death rate in consequence was not noticed.

Since 1896 all seal meat not used by the natives on St. George Island has been salted and the following winter freshened and fed to the foxes. The seal meat, being insufficient in quantity, has been supplemented by dried or salt fish.

Coincident with the regular feeding begun in 1897, the old methods of trapping were abandoned. These consisted of death traps, so called, and steel traps, and a method of taking foxes from their warrens. The method of trapping now in vogue consists of capturing the animals in a large cage, in which the food intended for them is placed. Upon capture, the animals are subjected to a rigid examination and all undesirable ones are killed forthwith. Males left for breeding purposes must weigh at least 10 pounds and females at least 7½ pounds, and be either young or in the prime of life. In taking the live weights a strap

is looped around the tail and the beast suspended from a spring balance attached to the ceiling of the building. The age is determined by an examination of the teeth. This is done by inserting a soft gag in the mouth and inspecting the teeth at close range. Those dismissed as breeders are branded by cutting a ring in the fur of the tail, males being branded near the end, females near the base. The men handling the foxes use heavy leather mittens.

On post-mortem examination of the animals killed in trapping the stomachs are found to carry in addition to the bait taken in the trap, grass, feathers, wild parsnip, fish bones, bird or seal bones, dirt or sand, and occasionally tunicates, sea eggs and fox fur. The intestines vary between six and ten feet in length, and were found to carry grass, feathers, wild parsnip, dirt, gravel, bones and sometimes tunicates and fox fur.

The bulk of males weighed between 8½ and 13½ pounds. That of females between 6 and 11½ pounds. Male skins when ready for market measure on an average 30 inches in length, 11 in breadth; the females are about one inch shorter and an inch narrower. The tails of both sexes are about the same length, viz., 15 inches. As a rule the fur of the female is inferior to that of the male, and among the males the best fur is found on the two- and three-year olds.

The breeding season is confined to March and the first half of April, and the young are born in litters of from five to twelve, in May and early June. Birth is given on the surface of the ground, but shortly afterwards the mother transfers the young to some place under ground, from which they do not emerge until several weeks old. While the birth rate is large, the infant mortality is very great, as only about two per female, on an average, reach maturity. They are born blind and weigh about 2½ ounces each. The eyes open on the fifteenth day, by which time the head and the tail take on a fox-like appearance. The teeth come through at or shortly after this time.

Occasionally one white fox is found in a litter of blue. Since 1897 a continuous effort has been made to exterminate white foxes, and results indicate that in time this will be accomplished, or at least that the white strain will be reduced to a minimum.

Evidence of diseases is scanty. Two cases of tuberculosis, one of uremic poisoning and thirteen cases of mange have been discovered. From the evidence at hand the males seem better able to

survive adverse climatic or other conditions than the females.

It is generally thought the animals pair for breeding purposes, but there is only one authentic case of paired foxes jointly engaged in feeding and guarding the same litter of young. The different methods of branding have shown that foxes often seen playing together in the spring are of the same sex. There have been six cases of promiscuous sexual intercourse witnessed.

It is customary on St. George Island to have 250 pairs for breeding purposes annually. After the breeding quota is secured all unbranded animals coming into the trap are killed and their skins secured. The annual yield of skins varies between 400 and 500.

On St. Paul Island, where artificial feeding was not attempted while a sufficient nucleus remained, fox life is almost extinct.

The Law of Recombination in Second Generation Hybrids: W. J. SPILLMAN.

It was pointed out that Mendel discovered three important laws: namely, the law of dominance, the law of separation and the law of recombination in the second generation.

The first two laws have been adequately recognized by most breeders, but the third law, which is by far the most important from the standpoint of breeding practise, has not been sufficiently emphasized. The law of recombination may be stated thus: In the second generation of a hybrid there tends to appear every possible combination of the original parent characters, the proportion of the population constituted by each type being $2^m/4^n$, in which m is the number of characters with reference to which the type is heterozygote and n the total number of characters involved in the cross.

It was pointed out that in practise the application of this law is limited:

1. By the number of individuals in the second generation, which must be numerous enough to permit the types to occur under the operation of the laws of chance.
2. The hybrid must be fertile.
3. The presence of cryptomeric factors may give unexpected results.
4. Non-Mendelian characters would be independent of this law.
5. In some crosses, such as produced Burbank's Primus berry, irregularities in mitosis might counteract the application of the law.

The recent work of Professors Price and Drink-

ard on tomato hybrids was given as an illustration of the recombinations of original parent characters, each of the eight possible types being shown. Illustrations were given of polled Hereford cattle produced by crosses between horned Herefords and polled Durham cattle. The application of the law of recombination at the Washington State Experiment Station has resulted in the production of a winter club wheat which is now rapidly replacing the spring clubs of that section. These wheats yield considerably more than the common wheats of the section and are worth a more for flour-making purposes.

The Lewis and Clark Cavern National Monument of Montana: V. K. CHESNUT.

The speaker exhibited lantern slides illustrating the features of great geologic and historic interest. The cavern which is remarkable on account of the great diversity of form, and the snow-white beauty of its drip rock, especially the helictitic forms, is a steep comparatively unexplored abyss in an isolated earth-block of Madison limestone very closely bounded on two sides by faulting planes of profound depth separating it from the Belt formation and the Three Forks shale. Including the various halls, grottoes and chambers already discovered it is about a mile in length, the largest single room being about 125 feet in diameter with supporting columns one to three feet thick running up to twenty feet in height. No excavation has been made for vertebrate fossils. The limestone itself is made up largely of blastoid stems.

Of the existing living forms the only specimen taken of unusual importance was a single phalangid spider, which has been credited recently by Professor Nathan Banks as the type of a new genus, *Cryptobunus*. The cavern, being 1,600 feet above the Jefferson River at Limespur, overlooks 75 miles or more of the Lewis and Clark route along the Jefferson and Gallatin rivers and hence it seemed appropriate that the cavern should be conserved forever a monument to the memory of these intrepid explorers. The proclamation creating it a national monument was made under the act of June 8, 1906, entitled "An Act for the Preservation of American Antiquities" and was signed by President Roosevelt on May 11, 1908.

M. C. MARSH,
Recording Secretary

THE ANTHROPOLOGICAL SOCIETY OF WASHINGTON

THE 430th regular meeting was held March 2, 1909. A preliminary presentation and explana-

tion was made by Mr. C. H. Robinson of a number of pieces of pottery, principally from Alamakee County, Iowa. Afterward the president of the society introduced Mr. Charles F. Warren, of the Bureau of Labor, who delivered a lecture of popular character on "Mexico, Its People and Customs," illustrated by colored slides. In the course of this lecture Mr. Warren touched upon the cathedrals, public buildings, gardens, markets and characteristic customs in Mexico, Cuernavaca, Puebla, Guadalajara, Guanajuato, Oajaca and other places, gave some fine views of the ruins of Mitla, and some superb examples of Mexican scenery. Finally a word was added regarding the passing of the old Mexican life and the coming of the new under President Diaz.

THE 431st regular meeting of the society, March 16, 1909, was devoted to an address by Professor William H. Holmes, chief of the Bureau of American Ethnology, on "Outlines of South American Anthropology." Professor Holmes had just returned from the Pan-American scientific congress at Santiago, Chile, which he attended as special representative of the Smithsonian Institution.

He introduced his remarks by a brief sketch of the congress itself, and illustrated the journey by numerous water-color drawings. An outline of the geological development of the South American continent and the evidence of the presence of man during the Tertiary and Quaternary times were given. The tribes of the great Andean highland and their remarkable culture were described, and contrasted with the peoples and cultures of the lowlands. The wonderful progress made by the Incas, Aymaras and Chimus was illustrated by a large number of lantern slides.

Mr. W. E. Safford, of the Bureau of Agriculture, added some particulars gathered during his own sojourn in South America.

JOHN R. SWANTON,
Secretary

THE PHILOSOPHICAL SOCIETY OF WASHINGTON

THE 662d meeting was held on March 13, 1909, Vice-president Wead in the chair.

The following paper was read by invitation:

Balloon Voyages and the Use of Air Currents:

Mr. H. H. CLAYTON, Meteorologist of the Blue Hill Observatory.

The balloon was invented about one hundred and twenty-five years ago, and at first was of scientific interest only, being early employed by the English for meteorological observations. The

Germans were the next to make use of it for similar investigations.

The use of sounding balloons equipped with self-recording instruments, the methods and the results obtained with them over land and ocean areas in different regions of the globe, were discussed at some length. The results show that in the upper regions in temperate zones the trend of the air currents is easterly, while in the equatorial regions they are to the westward. In all the regions of the globe so far investigated inversion of temperature takes place at an altitude of nine miles or so; this occurs at all times of the night as well as the day, and the inversion is found to be somewhat more marked in the equatorial regions than elsewhere.

An interesting account was given of the voyage of the successful balloon in the Gordon Bennett international balloon race from St. Louis in 1904, in which the speaker was one of the invited participants. It was pointed out how the knowledge of the circulation of the upper layers of the air was utilized in making this balloon voyage of forty hours' duration to the Atlantic coast. A number of lantern slides were exhibited illustrating this voyage, and two subsequent ones which the speaker had made. It was the speaker's belief that the knowledge of air currents is destined to play an important part in the ballooning of the future.

R. L. FARIS,
Secretary

THE ELISHA MITCHELL SCIENTIFIC SOCIETY OF THE UNIVERSITY OF NORTH CAROLINA

THE 181st meeting of the Elisha Mitchell Scientific Society was held in the main lecture hall of Chemistry Hall, Tuesday, 7:30 P.M., February 9, 1909.

Professor W. C. Coker described a visit to Luther Burbank in his California home, illustrating his address with lantern slides and numerous specimens of Burbank's productions.

THE 182d meeting was held in the main lecture hall of Chemistry Hall, Tuesday, March 9, 1909, 7:30 P.M. The program was as follows:

Professor D. H. Dolley: "The Pathological Cytology of Surgical Shock: I., Preliminary Communication—The Alterations occurring in the Purkinje Cells of the Cerebellum."

Professor A. H. Patterson: "Exhibition of a Series of New Vacuum Tubes."

ALVIN S. WHEELER,
Recording Secretary